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ABSTRACT

Borrowing and its implications for Turkish phonology is examined, focusing on words with initial and final consonant clusters. A brief summary of the relevant portions of Turkish phonology is presented. A formulation of the rules of lateral conditioning and velar conditioning is shown to successfully account for almost all the relevant borrowing naturalizations into Turkish. These rules are internally motivated. It is contended that it would be preferable to give up Foster's formulation which makes the assumption that backness of the velars and the laterals is determined by the adjacent vowels. The proposed formulation provides a nearly uniform treatment of cluster restrictions, predictability of the suffixed forms, and the reduction in the number of exceptions. The need for a thorough reconsideration of the interaction of vowel harmony and consonant harmony is indicated. (SW)

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# BORROWING AND ITS IMPLICATIONS FOR TURKISH PHONOLOGY[1]

Mehmet Yavaş

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> In linguistic change we have a window on the form of linguistic competence that is not obscured by factors like performance.
>
> P. Kiparsky

Borrowing, it has been claimed, provides evidence for the phonologist who seeks psychological verification of his thory in order to confirm him in the correct solutions. The main motivation for the analysis of borrowing is the possibility that the phonological properties of a language largely determine both the phonological shape and the phonological realization of a loan-word. Thus, by analyzing occurring borrowed forms and/or conducting the necessary tests on foreign sound perception, various aspects of speakers' internalized phonology can be determined. This would be a further test for the internally motivated rules of the phonological component of the target language: if the rules of nativization do not correspond to the internally motivated rules of the language, it could raise serious doubts about previous formulations of the phonological component of the language in question. Or, looking at it from another perspective, the lack of such a correspondence would open to question the very assumption that borrowing can reveal facts about the native phonology.

In this paper I shall examine certain borrowings into Turkish-- words with initial and final consonant clusters-- and try to show that the treatment of these borrowings has serious implications for the phonology of Turkish.

Before going into detailed discussion of the nativization of the foreign forms, a brief summary of the relevant portions of Turkish phonology is necessary. The vowel system of contemporary standard Turkish consists of eight vowels, usually defined by the distinctive features back, high and round.

| | a | e | o | ö | u | ü | ɨ | i |
|---|---|---|---|---|---|---|---|---|
| back | + | - | + | - | + | - | + | - |
| high | - | - | - | - | + | + | + | + |
| round | - | - | + | + | + | + | - | - |

A rule of vowel harmony makes all vowels in the same phonological word agree for the feature [back] , while another rule applies only to high vowels, making them agree in rounding. The two rules are sometimes written in collapsed form:

$$\begin{bmatrix} +\text{syl.} \\ \langle +\text{high} \rangle \end{bmatrix} \longrightarrow \left[ \alpha \text{back} \; \langle \beta \text{round} \rangle \right] \Big/ \left[ +\text{syl.} \; \alpha \text{back} \; \langle \beta \text{round} \rangle \right] \quad C_0 \text{ ——}$$

The rule applies iteratively.

It has been customary to say that words with back vowels also have back,or velar, variants of the lateral liquid and velar stops; whereas words with front vowels have palatal laterals, and velar stops become the corresponding nonstrident palatals. A mass of data of the following type suggests that a single rule ought to account for both vowel and consonant harmony.

| | | | | |
|---|---|---|---|---|
| A. | k'irpik | 'eyelashes' | kayɨk | 'boat' |
| | heyk'el' | 'statue' | sakal | 'beard' |
| | g'el'ir | 'comes' | galat | 'mistake' |

The rule posited would then look something like the following:

$$\left\{\begin{matrix} V \\ K \\ l \end{matrix}\right\} \longrightarrow [\alpha \text{ back}] \quad / \quad \text{in some environment}$$

Lees (1961) tries to capture the above facts in such a single rule to account for both vowel and consonant harmony. Foster (1969) criticizes this analysis and suggests that it is much more beneficial to look at the consonant harmony as a phenomenon separate from vowel harmony. He believes that consonant palatalization has little directly to do with vowel harmony. His argument is supported by the following examples.

| | | | | |
|---|---|---|---|---|
| B. | l'akɨrdɨ | 'word' | l'amba | 'lamp' |
| | l'ahana | 'cabbage' | l'apa | 'rice pudding' |
| | kar | 'snow' | kardan | 'from snow' |
| | k'ar | 'profit' | k'ardan | 'from profit' |
| C. | dak'ika | 'minute' | harek'et | 'movement' |
| | hak'ikat | 'truth' | šeftal'i | 'peach' |

In group B, the vowels of the words all obey the constraints of the vowel harmony rule, but some of /K/'s and /l/'s are exceptional. In group C, the converse obtains: the vowels are exceptional but the backness of the velars and /l/ seems to be predictable on the basis of the adjacent vowel. To capture this generalization Foster posits a rule which he calls 'Velar and Lateral Assimilation'.

$$\left\{\begin{matrix} K \\ l \end{matrix}\right\} \longrightarrow [\alpha \text{ back}] \quad / \quad \underset{[\alpha \text{ back}]}{V} \quad C_0'$$

where the environment statement is an abbreviation for the following ordered environments:

| | |
|---|---|
| $\underline{\quad}\,VC$ | a. |
| $\underline{\quad}\,\overline{CV}$ | b. |
| $\overline{V}\,\underline{\quad}$ | c. |
| $\underline{\quad}\,\overline{V}$ | d. |

Of course this would be a repetition of a significant part of a general harmony rule such as Lees', but there is no reason why the forms of the velar stops and /l/ in group A would not be derived by the above 'Velar and Lateral Assimilation' rule. Since we **must** have this latter rule to account for the words in C, the forms in A will be derived correctly if we order it to follow the harmony rule. We can simplify the harmony rule by making

it apply only to vowels (consonants in group B whose backness is contrary to that predicted, will of course be exceptions to the Velar-Lateral Assimilation rule). Foster concludes that the above considerations are strong enough to force the separation of consonant assimilation from vowel harmony.

Now let us look at some examples of more recently borrowed vocabulary.

| | French | | Turkish |
|---|---|---|---|
| D. | grip | 'influenza' | g+rip |
| | gl'isɛrin | 'glycerine' | g+l'iserin |
| | grɛv | 'strike' | g+rev |
| | kl'aksɔ̃ | 'horn' | k+l'akson |
| | krɛm | 'creme' | k+rem |
| | krɛdi | 'credit' | k+redi |
| | pl'až | 'beach' | pil'až |
| | pl'an | 'plan' | pil'an |
| E. | spikɛr | 'announcer' | sipiker |
| | smɔkin | 'dinner jacket' | s+mokin |
| | tramvay | 'trolleybus' | t+ramvay |
| | trɛ̃ | 'train' | tiren |
| | priz | 'plug' | piriz |
| | kravat | 'tie' | k+ravat |
| | frɛ̃ | 'brake' | firen |
| | gram | 'gram' | g+ram |

The syllable structure condition of Turkish which can be stated as

$$+ \left(\begin{bmatrix} -\text{syl} \\ . \end{bmatrix}\right) \qquad \begin{bmatrix} +\text{syl} \\ . \end{bmatrix} \qquad \left(\begin{bmatrix} -\text{syl} \\ . \end{bmatrix}\right) \qquad \left(\begin{bmatrix} -\text{syl} \\ . \end{bmatrix}\right) +$$

does not permit initial consonant clusters. The incoming foreign words have been modified in accordance with this condition. Holden (1972), looking at several languages which exhibit identical restrictions with regard to initial consonant clusters, comes to the conclusion that the replacement of this unpermitted sequence is a language specific phenomenon.[2] In modern Turkish epenthesis of a high vowel is used exclusively.[3]

If we examine the words borrowed into Turkish with original consonant clusters, we immediately realize that the epenthetic vowel in the words in group D does not conform to the backness harmony, while in group E it does. As far as group E is concerned there is no problem: we can posit a high vowel whose backness would be determined by the vowel harmony rule.[4] This is exactly what Foster would like to do, for his assumption is that in the vast majority of the cases the epenthetic vowel agrees in backness and rounding with the vowel following it, and that the words in group D are merely exceptional cases. However, this assumption does not hold for modern Turkish, for there is a multiplicity of cases which do not conform to vowel harmony. To attempt to account for the rounding and backing of epenthetic vowels by using only the vowel harmony rule is simplistic and doomed to failure.

There are two things to account for. The first is the choice of the epenthetic vowel. Considerations from markedness would tell us to choose /i/

for next to /a/, /ı/ is the most favored vowel.[5] The second task is to find an explanation for the words in group D. Clearly, if there is a constraint in the language that only certain vowels can follow or intervene between certain consonants, then the epenthesis rule must be sensitive to this constraint. This is what I would like to suggest. Note that, according to Foster's formulation with the vowel harmony and Velar-Lateral Assimilation rules, the words in group D must be treated as exceptions. If, however, we reverse our perspective with regard to consonant harmony, assigning certain consonants a pivotal role, and assume that these consonants are the decisive elements for the occurrence of certain vowels, all of the apparent exceptions can be accounted for. We would need a rule which would determine the backness of the epenthetic vowel according to the preceding velars. Moreover, such a velar conditioning rule would have to be ordered after the Vowel Harmony rule, so that the latter will not undo its effects.

Velar Conditioning Rule

$$\begin{bmatrix} +\text{syl.} \\ +\text{high} \end{bmatrix} \longrightarrow \begin{bmatrix} \alpha\text{back} \end{bmatrix} \Big/ \# \begin{bmatrix} K \\ \alpha\text{back} \end{bmatrix} \text{———} C$$

Thus the following derivations:

| | /grip/ 'flu' | /krem/ 'creme' |
|---|---|---|
| Ep. Vow. | girip | kirem |
| Vow. Har. | —— | —— |
| Vel. Cond. | g+rip | k+rem |
| | g+rip | k+rem |

This analysis gains further support when we examine certain Arabic words borrowed into Turkish. There is a problem in the borrowing of Arabic /qi/ because of the fact that the sequence contains a voiceless uvular stop followed by a front vowel. In such borrowings the front vowel /i/ is replaced in Turkish by a back vowel /+/, as in the following examples:[6]

| | | | | | |
|---|---|---|---|---|---|
| Arab. | /qibla/ | [qible] | 'direction of Mecca' | Turk. | k+ble |
| | /qidam/ | [qidem] | 'seniority' | | k+dem |
| | /qisma/ | [qisme] | 'destiny' | | k+smet |

However, when we look at some further examples with initial CC sequences, we observe that the above mentioned Velar Conditioning Rule alone is inadequate.

| | | | | |
|---|---|---|---|---|
| Fr. | pl'an | 'plan' | Turk. | pil'an |
| | pl'až | 'beach' | | pil'až |

In order to account for these examples we need one more rule which I shall call the Lateral Conditioning Rule:

$$\begin{bmatrix} +\text{syl.} \\ +\text{high} \end{bmatrix} \longrightarrow \begin{bmatrix} \alpha\text{back} \end{bmatrix} \Big/ \# \; C \text{———} \begin{matrix} l \\ \begin{bmatrix} \alpha\text{back} \end{bmatrix} \end{matrix}$$

This Lateral Conditioning rule is to be ordered after the Vowel Harmony rule and before the Velar Conditioning rule. Thus, the following derivations:[7]

| | /kl'üp/ 'club' | /kl'ima/ 'heating' | /kl'akson/ 'horn' |
|---|---|---|---|
| Ep.Vow. | kil'üp | kil'ima | kil'akson |
| Vow.Har. | kul'up | kil'ima | kɨl'akson |
| Lat.Cond. | ——— | ——— | kil'akson |
| Vel.Cond. | kul'üp | kɨl'ima | kɨl'akson |
| | kul'ŭp | kɨl'ima | kɨl'akson |

Note the need for separation of Velar Conditioning from Lateral Conditioning rule although it is very tempting to collapse them. As is obvious from the examples such as kul'üp, kɨl'ima etc., there is a clash between these two rules, and velars win in this conflict. That is the reason for the rule ordering given above.[8]

We should also mention that there is another piece of suggestive evidence for this Lateral Conditioning rule. If we look at the Vowel Harmony rule operating on suffixes, we observe certain exceptional cases. The so-called exceptional cases to otherwise very regular suffix harmony[9] can be explained in terms of the stem final /l'/:

| | | | |
|---|---|---|---|
| gol' | 'goal' | gol'ü | 'his goal' |
| hal' | 'state' | hal'i | 'his state' |

I think that assigning the pivotal role to /l'/ is the only possible explanation for this irregularity because, regardless of the preceding vowel /l'/ is followed by a front vowel in suffixation. Of these two rules, Velar Conditioning rule is much more widespread in the language, for it is in conformity with a very large portion of the native vocabulary. The Lateral Conditioning is restricted: it operates regressively for the epenthetic vowel, and progressively for suffixation. Another point to be made relates to the exceptionality of /l'/ in the group B words. Since all word initial laterals are /l'/ and can be followed by any vowel, there is no need to treat these consonants as exceptions in the words mentioned in group B.

To sum up what I have said so far, the rules of Lateral Conditioning and Velar Conditioning, as formulated, can successfully account for almost all the relevant borrowing naturalizations into Turkish. Moreover, these rules are internally motivated. Thus, it is my contention that we can achieve a lot more by giving up Foster's formulation which makes the assumption that backness of the velars and the laterals is determined by the adjacent vowels.

This would, of course, bring up the question of whether the claim of having two underlying sets of velars and laterals holds for the native vocabulary. I think this question can only be answered after another related problem- namely the definition of native versus borrowed vocabulary- has been solved. No matter how hard one tries to avoid this question, sooner or later he has to cope with it. If we define the native system as that set of properties exhibited by the morphemes of the language prior to the introduction of the mass of Arabic loan words, then we are bound to describe eleventh century Turkish. Any subsequently borrowed words would violate the system thus defined, not only before their adaption, but also after their adaption because our reference point is still eleventh century Turkish. Although the etymological argument would make sense for historical

reconstruction, it definitely fails to account for the synchronic state of the language. Any study of loan-words will show that in many instances the adaptation to the native system is incomplete and that there remain phonological features which do not fit the system. For a certain period of time these words would be felt to be strange or 'foreign', but sooner or later, with increased usage and the introduction of many other borrowings showing the same peculiarities, native speakers would no longer feel the forms to be unusual and would begin to employ them in everyday situations with the same facility as the so-called native words. Thus, the new features become an integral part of the native system. In order to account for this change in the native system, a definition of 'foreign' should include the judgment of the native speakers, for we have no way of telling what the system is without the judgment of the native speakers. Thus, I go along with Holden and define a word as 'foreign' if it is felt by native speakers to be in violation of any of the phonological, morphological, syntactic or semantic constraints of the native system at a particular point in time. If we agree with the foregoing discussion, then the answer to the above question, whether we could have two sets of underlying velars and laterals, would be 'yes', for the words exhibiting the contrasts in group A,B and C have been in the language for several centuries and are judged as native by the speakers of the language. One might argue, however, that this analysis would create more underlying segments and rules than other investigators have proposed. I do not adhere to the generally accepted view in Generative Phonology, which aims to reduce the number of underlying segments for the sake of 'economy', because I do not believe that such an attempt could account for the facts exhibited in our data. If our priority is merely 'elegance', then of course 'economy' is justified. However, if we are interested in describing present-day Turkish, then, no matter how awkward the analysis may look, we should be faithful to the facts. Moreover, there has been no evidence of any sort suggesting that having one, two or more additional phonemes and rules will overly tax human linguistic ability.

Let us now turn to words with final clusters. Here we see a relatively more complex situation. It seems that we have two competing solutions, namely 'epenthesis' versus 'syncope'. Consider the following examples.

| F | | | | Nominative | Accusative | Ablative |
|---|---|---|---|---|---|---|
| Arab. | ilm | 'science' | Turk. | il'im | il'mi | il'imden |
| | nutq | 'speech' | | nutuk | nutku | nutuktan |
| | wasf | 'quality' | | vasɨf | vasfɨ | vasɨftan |
| | qusr | 'defect' | | kusur | kusru | kusurdan |

| G. | Nominative | | Accusative | Ablative |
|---|---|---|---|---|
| Turk. | beyin | 'brain' | beyni | beyinden |
| | boyun | 'neck' | boynu | boyundan |
| | alɨn | 'forehead' | alnɨ | alɨndan |
| | burun | 'nose' | burnu | burundan |

In group F, in the nominative case, the unpermitted consonant clusters are modified and a vowel appears. But in the accusative case(or for that

matter with any suffix that begins with a vowel) the vowel of the nominative stem is not seen. Turning to group G words, we observe a similar pattern of alternation. The last vowel of the nominative forms is not found in the corresponding accusatives. We may hypothesize that the words in G, as well as those in F, have underlying forms with consonant clusters and these clusters are then broken up with the following epenthesis rule:

$$\emptyset \longrightarrow i \;/\; C ____ C \begin{Bmatrix} \# \\ C \end{Bmatrix}$$

However, a second way of looking at the same data might suggest having underlying form with a vowel, that is, with the consonant cluster already broken, and positing a vowel dropping rule.

$$\begin{bmatrix} V \\ +\text{high} \end{bmatrix} \longrightarrow \emptyset \;/\; VC ___ CV$$

But we have forms like

| | Nominative | | Accusative | Ablative |
|---|---|---|---|---|
| Turk. | kad+n | 'woman' | kad+n+ | kad+ndan |
| | domuz | 'pig' | domuzu | domuzdan |
| | koyun | 'sheep' | koyunu | koyundan |

in which the second vowel does not alternate, and these support the epenthesis analysis. However, the following forms would tell us that epenthesis is restricted to certain phonologically definable cluster types. Turkish permits certain final clusters.

| | | | | |
|---|---|---|---|---|
| H. | sarp | 'steep' | sarp+ | sarptan |
| | halk | 'folk' | halk+ | halktan |
| | aşk | 'love' | aşk+ | aşktan |

These and many other examples indicate that the permitted final clusters are describable with the following if-then condition:

$$\text{If: } \begin{bmatrix} -\text{ syl.} \end{bmatrix} \quad \begin{bmatrix} -\text{ syl.} \end{bmatrix} +$$

$$\text{Then: } \left\{ \begin{bmatrix} +\text{ son.} \end{bmatrix} \quad \begin{bmatrix} -\text{ son.} \end{bmatrix} \right.$$

$$\left. \begin{bmatrix} +\text{ cont.} \\ +\text{ strid.} \\ -\text{ voice} \end{bmatrix} \quad \begin{bmatrix} -\text{ son.} \\ -\text{ del. rel.} \end{bmatrix} \right\}$$

That is, syllable final $C_1\ C_2$ is permitted only if $C_1$ is a sonorant and $C_2$ is an obstruent, or if $C_1$ is /s/ or /š/ and $C_2$ is a stop.[10]

Foster rejects the epenthesis argument because of the following clash with the Vowel Harmony rule. Consider the following:

| | | | | | |
|---|---|---|---|---|---|
| Arab. | wakt | 'time' | Turk. | vak'it | Acc. vakti |
| | bahs | 'discussion' | | bahis | bahsi |
| | aks | 'reflection' | | ak'is | aksi |

He argues that if we assume the underlying representation of 'time' to be /vakt/ and /vakt-i/ and insert the high vowel into the former, we will have a hard time explaining why these forms are exceptions to the Vowel Harmony rules. Therefore, he prefers syncope. The words in group G are all native

Turkish words and refer to body parts. Foster formulates his syncope rule in terms of a semantic grouping.

$$V \longrightarrow \emptyset \;/\; C_1 \begin{bmatrix} +\text{high} \\ +\text{body parts} \\ V \end{bmatrix} C_1 + V$$

He has further justification for this kind of restriction, for we have the following contrasting pairs:

| | | | |
|---|---|---|---|
| koyun | 'sheep/chest' | oğul | 'bee swarm/son' |
| koynu | 'his chest' | oğlu | 'his son' |
| koyunu | 'his sheep' | oğulu | 'his bee swarm' |

However, as we have seen, the words in group F, which have nothing to do with body parts, follow the same route. I think the epenthesis solution is more explanatory and can deal with the above variations in a much better way. By positing underlying forms with consonant clusters we will be able to predict the suffixed forms in the following way.

| | boyn | boyn-i | kadɨn | kadɨn-i |
|---|---|---|---|---|
| Epen. | boyin | ——— | ——— | ——— |
| Vow.Har. | boyun | boynu | ——— | kadɨnɨ |
| | boyun | boynu | kadɨn | kadɨnɨ |

If we have the underlying form with a second vowel, i.e., with the cluster broken up already, we will have no way of knowing what the form of the root before a vowel will be. Consider these examples.

deniz 'sea' isim 'name'

Here we cannot tell whether 'to the sea' should be *denze or denize, or whether 'his name' should be ismi or *isimi.

It is true that, according to this analysis, vakti 'his time', bahsi 'his discussion' etc., would seem to be exceptions to the harmonic constraints, but I believe that the occurrences of exceptional vowels in the suffixed forms as well as in the nominative forms could be explained with reference to stem final palatalized consonants. One may argue that, even if we concentrate on these palatalized consonants, this would only help to explain the non-harmonic suffixed forms while for the nominative forms we are still in the dark. But this is not the case. Note that we have already shown that /l'/ conditions the frontness of epenthetic vowels.

| | | | |
|---|---|---|---|
| pl'an | 'plan' | Turk. | pil'an |
| pl'až | 'beach' | | pil'až |

We observe the same thing with final clusters.

| | | | | | |
|---|---|---|---|---|---|
| Arab. | nakl' | 'transportation' | Turk. | nak'il' | Acc. nakl'i |
| | qaul' | 'agreement' | | kavil' | kavl'i |

I think that the same principle can account for the exceptional vowels that we find following /t/ and /s/ in bahis-bahsɨ, vak'it-vakti. That is, similar to /l'/, the consonants in question have fronting effects to the non-harmonic vowels. In alternating forms like saati-saatɨ 'his watch', hakikati-hakikatɨ 'his truth' the author clearly feels that there is articulatory and auditory difference in stem final consonants. To attribute this difference to the accusative ending /i/ would not help, for one can find the same

difference in the nominative forms. One should realize, however, that we need a detailed phonetic analysis of these consonants before pushing this idea too far: what I suggest is only tentative in the light of our present knowledge. It does fit the Turkish spoken by the author however.

Considering the advantages to be gained from our formulation, namely a nearly uniform treatment of cluster restrictions, predictability of the suffixed forms and the reduction in the number of exceptions, this formulation should provide a tenable basis for the revision of the analysis given by Foster. What I have said in this paper with regard to final clusters has been discussed also by Lees, Pyle, Swift and Mc Carthy, the first two being proponents of epenthesis and the last two agreeing with Foster. However, there has been no detailed account of initial cluster modification. Neither has there been any sort of uniform treatment of the similar constraints which apply to both initial and final clusters found in the modern language. This analysis points up the need for a thorough reconsideration of the interaction of Vowel Harmony and Consonant Harmony. In the light of the evidence presented here, we should think a lot more about what Menges (1968, p.80) said:

> Vocalism and consonantism are conditioned upon each other, so that it is impossible to speak of vowel harmony alone -- as is usually done in grammars of Turkic languages--, the term sound harmony as applied to the entire sound system is the proper expression.

## Footnotes

1 I am indebted to Dr. Robert L. Rankin and Dr. Kenneth Miner for their many helpful comments and criticisms. I bear the responsibility for whatever errors remain.

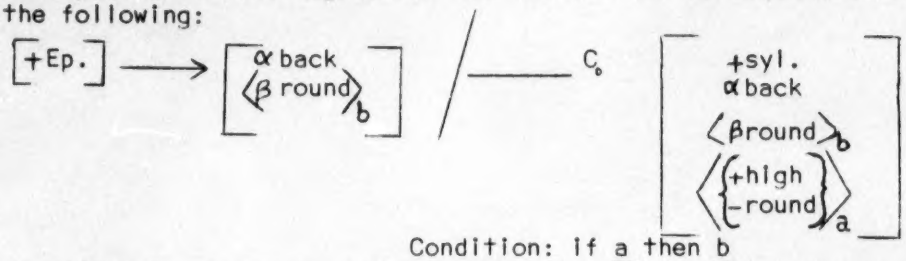
2 Replacement of unpermitted consonant clusters is done by a) epenthesis: Hawaiian, Kazakh, Turkish, Japanese, b) prothesis: Kazakh, Turkish, c) simplification: Finnish, Japanese, Hawaiian.

3 It is evident from earlier borrowings that Turkish formerly used prothesis rather than epenthesis for initial CC sequences. Just exactly how and when the prothesis rule was replaced by epenthesis is not known to the author.

Although the replacement of unpermitted consonant clusters is language specific in nature, if vowel epenthesis is involved there is an almost uniform pattern in languages in favor of high vowels.

4 It should be mentioned that the rule posited for vowel harmony would not be able to handle the examples in group E, for it assumes that the harmony is progressive. These examples, although they are regressive, should not suggest something entirely different from the harmony rule posited. That is, the bidirectional character of the vowel harmony does

not effect the pivotal function of the first underlying vowel in the word, because the epenthetic vowel agrees with that first vowel again. At any rate, I think, it is reasonable to assume that the vowel harmony is functionally the same for the regressive and the progressive cases. The rule for epenthetic vowel agreement for the initial CC sequences would be like the following:




Condition: if a then b

This condition is needed in order to account for the cases like k+rom 'chrome', s+mokin 'dinner jacket' etc., for the epenthetic vowel in these examples does not agree in rounding with the following vowel.

5 Evidence from child language acquisition as reported by Jakobson suggest that /i/ is more basic than /u/, and emerges as the second vowel after /a/. On the other hand, markedness as presented by Chomsky and Halle (1968) makes no preference between /i/ and /u/, for they are of equal complexity with respect to one another(both are assigned the complexity measure 1). However, one can find arguments in favour of /i/ in the literature. As Zimmer has pointed out there is some evidence that front vowels should be considered as less marked than non-low back vowels. Historically, fronting of back vowels appears to be more common than backing of front vowels. Furthermore, William Wang, as reported by Zimmer, has pointed out that the tongue positions for front vowels such as [i] and [e] are, on the whole, closer to the rest position than those for back vowels like [u] and [o].

6 McCarthy argues that /e/ in the second syllable in these Turkish examples shows that, according to vowel harmony, the first vowel was originally a front vowel /i/ rather than a back vowel/ɨ/. However, it should be noted that [æ] is an allophone of /e/ in Turkish. It is therefore perfectly natural that these vowels should be borrowed as /e/. McCarthy's examples have no implications for the earlier status of /i/.

7 The word bul'uz 'blouse' would be an exception to my formulation, for the rules would give bül'uz.(This form occurs in some dialects)

8 McCarthy in his examples of /l'/ conditioning the surrounding vowels-similar to his velar examples mentioned in 6- again ignores the phonetic closeness of Arabic [æ] to Turkish /e/ in the following words.

| | | | |
|---|---|---|---|
| Ar. | /al'am/ [æl'æm] 'despair' | Turk. | el'em |
| | /wal'wal'a/ [wæl'wæl'æ] 'outcry' | | vel'vel'e |

9 The only exception is the progressive suffix -yor in this case. As for the other noted exceptions like saati 'his watch', s+hhati 'his health etc., which are mentioned during the discussion of the final clusters, reference to the stem final consonants is necessary. This point will be discussed in a forthcoming paper.

10 Foster overlooks the fact that these clusters are describable in terms of natural classes and would treat the forms under H as exceptions to epenthesis analysis.

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